SOLAR OBSERVATIONS

SOLAR AND SKY RADIATION MEASUREMENTS DURING DECEMBER, 1930

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For reference to description of instruments and exposures, and an account of the method of obtaining and reducing the measurements, the reader is referred to this volume of the REVIEW, page 26.

Table 1 shows that solar radiation intensities averaged above the normal intensity for December at Washington, D. C., and Lincoln, Nebr., and slightly below normal at Madison, Wis.

Table 2 shows an excess in the total solar radiation received on a horizontal surface directly from the sun and diffusely from the sky at Washington, New York, and Fresno, and a deficiency at Madison, Lincoln, Chicago, and La Jolla.

For the year, as shown in the last line of Table 2, there have been unimportant percentage departures in the total radiation received, except at Washington, where there was an excess of 6.9 per cent, and at La Jolla, where there was a deficiency of 1.5 per cent, as compared with the annual average at the respective stations.

Skylight polarization measurements were obtained at Washington on 3 days, and give a mean percentage of 58, with a maximum of 62 on the 16th. At Madison, measurements were obtained on the 9th only, and gives a percentage of 72. Snow covered the ground throughout the month at this station except from the 5th to the 12th. At both stations the measurements obtained are close to average values for December at the respective stations.

TABLE 1.—*Solar radiation intensities during December, 1930*

[Gram-calories per minute per square centimeter of normal surface]

Washington, D. C.

Date	Sun's zenith distance: 8 a.m.	78.7°	75.7°	70.7°	60.0°	0.0°	60.0°	70.7°	75.7°	78.7°	Noon
	75th mer. time	Air mass: A. M.					P. M.				Local mean solar time
	e.	5.0	4.0	3.0	2.0	[1] 1.0	2.0	3.0	4.0	5.0	e.
	mm.	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*mm.*
Dec. 2	1.19		0.84	1.08	1.28			1.06	0.89	0.80	1.02
Dec. 3	2.16	0.90	0.95	1.10	1.29		1.29	1.10	0.96	0.84	1.88
Dec. 16	1.07	0.99	1.16	1.25	1.37		1.37	1.23	1.06	0.93	2.49
Dec. 18	2.87				1.26						1.52
Dec. 21	3.15				1.32						4.17
Dec. 23	2.74				0.91						2.74
Means		(0.94)	0.98	1.14	1.24		(1.33)	1.13	0.97	0.86	
Departures		+0.15	+0.08	+0.09	+0.01		+0.01	+0.10	+0.06	+0.06	

Madison, Wis.

Dec. 1	1.02	1.06	1.20	1.29							0.51
Dec. 8	3.30							0.98			3.99
Dec. 9	3.99	0.93	1.05	1.18				1.22			4.37
Dec. 15	1.52	0.89	1.16	1.30							1.68
Dec. 16	1.32	0.93	1.12	1.30							2.06
Dec. 17	1.37	0.72	0.85	1.01							1.96
Dec. 23	1.78			1.30							1.68
Dec. 30	1.19		1.14	1.21							1.12
Dec. 31	3.45							1.27			1.45
Means		0.91	1.09	1.23				1.16			
Departures		−0.05	−0.01	+0.02				−0.08			

[1] Extrapolated.

TABLE 1.—*Solar radiation intensities during December, 1930*—Con.

Lincoln, Nebr.

Date	Sun's zenith distance: 8 a.m.	78.7°	75.7°	70.7°	60.0°	0.0°	60.0°	70.7°	75.7°	78.7°	Noon
	75th mer. time	Air mass: A. M.					P. M.				Local mean solar time
	e.	5.0	4.0	3.0	2.0	[1] 1.0	2.0	3.0	4.0	5.0	e.
	mm.	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*mm.*
Dec. 8	3.15	0.71	0.91	1.09				1.21	0.96	0.89	4.57
Dec. 10	4.17							1.27	1.09	1.02	4.57
Dec. 11	3.15	0.98	1.07	1.22							3.45
Dec. 19	2.62		1.12	1.35							3.00
Dec. 23	2.49		1.05	1.22							3.63
Dec. 28	2.26			1.24				1.12			3.00
Dec. 29	2.87		1.13								3.00
Dec. 30	1.78		1.05	1.20				1.24			2.49
Dec. 31	2.87		1.22	1.34				1.35	1.18	1.05	2.87
Means		(0.84)	1.08	1.24				1.24	1.08	0.99	
Departures		−0.11	−0.02	+0.03				+0.08	+0.01	+0.03	

TABLE 2.—*Total solar radiation (direct+diffuse) received on a horizontal surface*

GRAM-CALORIES PER SQUARE CENTIMETER

Week beginning—	Average daily totals: Washington	Madison	Lincoln	Chicago	New York	Pittsburgh	Gainesville	Fresno	La Jolla	Miami
1930	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*
Dec. 3	141	87	129	36	79	80	210	214	234	280
Dec. 10	159	101	138	53	105	54	213	214	262	289
Dec. 17	154	116	169	51	106	38	92	231	271	198
Dec. 24 [1]	147	111	184	67	89	74	190	200	233	224
	Departures from weekly normals									
Dec. 3	−6	−34	−40	−34	−10			+25	−39	
Dec. 10	+20	−11	−19	−16	+16			+35	−15	
Dec. 17	+12	−7	−3	−25	+12			+58	−3	
Dec. 24	+5	−16	+3	−15	−9			+38	−17	
Accumulated departure at end of year	+8,405	+1,314	−808	+34	+1,230			−1,006	−1,947	
Percentage departures for the year	+6.9	+1.1	−0.6	±0.0	+1.3			−0.6	−1.5	

[1] 8-day means.

POSITIONS AND AREAS OF SUN SPOTS

[Communicated by Capt. J. F. Hellweg, Superintendent United States Naval Observatory. Data furnished by Naval Observatory, in cooperation with Harvard, Yerkes, Perkins, and Mount Wilson Observatories. The differences of longitude are measured from central meridian, positive west. The north latitudes are plus. Areas are corrected for foreshortening and are expressed in millionths of sun's visible hemisphere. The total area, including spots and groups, is given for each day in the last column]

Date	Eastern standard civil time	Heliographic: Diff. long.	Heliographic: Longitude	Heliographic: Latitude	Area: Spot	Area: Group	Total area for each day
1930	h m	°	°	°			
Dec. 1 (Naval Observatory)	12 23	−5.0	37.8	+8.0	46		
		+17.0	59.8	+8.5		15	
		+37.5	80.3	+14.5		170	
		+63.5	106.3	−9.0		309	540
Dec. 2 (Naval Observatory)	12 32	+8.0	37.5	+9.0		77	
		+56.0	85.5	+14.0		93	
		+77.0	106.5	−9.0		309	479